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METHODS FOR DEVELOPING PHARMACEUTICAL SCIENCE IN CHINA

An article by Hsieh Yu (薛 愚) /no biographic information available in FDD concerning the author/, entitled, "Problems Involved in Developing Pharmaceutical Science," advocates that pharmaceutical science in China must be given an independent status and must conform to the economic conditions of China's new society. The article discusses the following: methods of organizing pharmaceutical administration under the Ministry of Public Health; the production and distribution of pharmaceutical products; the acquiring of raw material, resources, capital, and manpower needed in pharmaceutical production; the need of establishing a pharmacopoeia; pharmaceutical research; revision of Chinese medicine; the need of rational distribution of pharmaceutical personnel in China; and the formulation of regulations for pharmaceutical merchants. The article advises on methods of training personnel in order to have about 200,000 pharmaceutical workers which are needed in China.

The following are excerpts from the article:

The development of New China's pharmaceutical science should be based on the two following principles:

1. It must be suited to the economic conditions of China's new society. China is not a capitalistic country like Great Britain and the United States, nor a socialistic country like the USSR, but a country of New Democracy principles.

2. Pharmaceutical science must be given an independent status; this does not say that pharmaceutical science is to be isolated. On the contrary, it is not only related to other sciences such as biology and physics, but it is closely linked with the sociological sciences. But this does not mean that pharmaceutical science is not an independent science.

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Chemistry is related to physics and biology, yet we cannot say that chemistry is physics or biology. By the same reasoning, pharmaceutical science is related to medical science, chemistry, biology, and engineering, but we cannot say that pharmaceutical science is medical science. It is a science, the independent nature of which must not be neglected in the early stages of its development.

On these two main principles we base the following discussion of some of the problems facing us.

Since the scope of pharmaceutical enterprises is extremely broad, the amount of difficult work involved is tremendous. Like medical policy, pharmaceutical policy in the Ministry of Public Health should be placed directly under the minister in the form of a Bureau of Pharmaceutical Policy or a similar organ. Persons in charge of pharmaceutical policy, as with medical policy, must be specialists, with comprehensive pharmaceutical ability. In my opinion, the pharmaceutical administration should be organized as follows:

Bureau of Pharmaceutical Policy

Department of Pharmaceutical Production

Division of Biological Pharmaceutical Products, Division of Chemical Pharmaceutical Products, Division of Medical Equipment, and Division of Drug-Manufacturing Equipment.

Department of Administration of Narcotic Products

Division of Manufacture, Division of Administrative Affairs, and Division of Auditing.

Department of Pharmaceutical Supplies

Division of Distribution, Division of Statistics, and Division of Storage and Transportation.

Department of Examination of Pharmaceutical Products and Food

Division of Examination of Biological Pharmaceutical Products, Division of Examination of Food, Division of Examination of Cosmetics, and Division of Examination of Finished Products.

Department of Pharmaceutical Policy

Division of Legal Medical Practice, Division of Standards, Division of Control, and Division of Commendation and Punishment.

Department of Medical Education

Division of Education, Division of Editing and Review, and Division of Propaganda.

Department of General Affairs

Division of Letters and Documents, Division of General Affairs, and Division of Accounting.

Pharmaceutical Affairs Planning Committee

The membership of this committee is to be composed of the country's pharmaceutical specialists and will hold several meetings each year; the number of meetings is to be governed by the need of the situation, in order to seek solutions for all problems related to pharmaceutical science.

There seems to be no need to explain the duties and functions of most of the various departments and divisions. The Department of Pharmaceutical Policy is to control the import and export of pharmaceutical products, as well as to manage the affairs of the China Pharmaceutical Company; to cooperate with and assist the Division of Distribution of the Department of Pharmaceutical Supplies in line of duty; and to regulate pharmaceutical merchants and private pharmaceutical factories. The Division of Editing and Review of the Department of Pharmaceutical Education is to edit, translate, review, and examine pharmaceutical textbooks, reference books, pharmaceutical terminology, and pharmaceutical magazines, as well as edit the Chinese Pharmacopoeia, etc.

The Division of Manufacture of the Department of Administration of Narcotic Products should set up factories for the manufacture of narcotics. The Department of Examination of Pharmaceutical Products and Food should establish comparatively large-scale, completely equipped, and standardized laboratories and pharmaceutical factories to investigate problems of pharmaceutical merchants, with regard to contents and standards of pharmaceutical products.

Distribution of Pharmaceutical Products

This is one of the most important problems of the future. The New Democracy stage is concerned with the manufacture of pharmaceutical products, while the socialist stage will be concerned with distribution. At present, manufacture should be based on the conditions of our nation's production of pharmaceutical products, as well as on the needs of the sick in general. Those medicines which we are not yet capable of producing in our country must be bought and distributed so as to preserve the health of the people.

The China Pharmaceutical Company will be organized to handle distribution. In addition to the central office, branches of the company should be set up in various provinces, cities, hsiens, and ch'u. Cooperative shops should be set up in ch'u, hsiens, and villages. The China Pharmaceutical Company will purchase products of various private and public pharmaceutical factories and companies in our country, thus providing incentive for their further development by offering to them advantageous conditions of distribution; it will import medical products most needed by our country and will ration narcotic products with minimum handling and cheap prices to people in need of such medicine. At the same time, it will adjust national medicine for the foreign market to gain foreign exchange to help stabilize our national currency.

Pharmaceutical Production

Production is to serve people and is not for profit. An independent country must not allow the health of its people to be controlled by foreigners. Therefore, under the principle of self-regeneration, we must learn from the experience of our Soviet friends in pharmaceutical production. Before 1917, almost 100 percent of the medicine used in Russia was imported, particularly from the Netherlands and Germany. We know that the period between 1917 and 1928 was the most difficult and most bitter stage of development of the Soviet Union. However, by 1929, her pharmaceutical production reached 88 percent, while her import of such products was lowered to 12 percent. By 1938, the Soviet Union had become entirely independent with regard to pharmaceutical supplies. After the end of World War II, the Soviet Union was not only self-sufficient in pharmaceutical products but also was able to assist the various People's Republics of Eastern Europe.

The condition of pharmaceutical production at the present stage of our nation is on a comparable level with those of Russia in 1917. With the Soviet Union as our teacher and guide we are sure of success in the development of pharmaceutical production if we are willing to learn from her diligently.

Capital, Resources, and Manpower

Important requirements for pharmaceutical production are raw material resources, capital, and technically-skilled manpower. In regard to resources, ingredients of inorganic pharmaceutical products consist of various kinds of metals, acid, and soda. Although our quantity of production is not great, it is nevertheless sufficient for purposes of medical, pharmaceutical, and chemical production. The most important source of inorganic pharmaceutical products is the coal-coke industry; with the possession of the Fu-hsun, Shih-chia-chuang, and Shih-ching-shan coal-tar factories, sufficient oil is now obtainable for producing medicines.

In regard to capital, it is indeed felt to be inadequate during this period of many desolations, pending recovery. However, with loans from the "friendly nation," plus 2 or 3 years of land reform and increased agricultural production, not only the people's purchasing power will be augmented and products for foreign trade increased, but also the question of capital can then be solved. That is why Chairman Mao has said: "The completion of land reform will pave the road to developing China's industries." As to the technicians needed for the manufacture of medicines, we must acknowledge the fact that they are indeed very few. We must borrow experts from the "friendly nation" and speed up the training of our technicians.

Also, factories must adopt the policy of gradual growth, as it is impossible to grow roots, sprout, bloom, and bear fruit at the same time. The selection of areas for factory sites has to be decided on the basis of local conditions in respect to raw material, motive power, equipment, and manpower.

It is my personal opinion that Northeast and North China should be selected as the main areas, with East China, the Central-South China area, and Southwest China as subsidiary districts.

Synthetic medicine can be produced in the Northeast and North China; inorganic medicine in Central-South China, Southwest China and Northwest China. Chinese herbs can be processed in Northeast and North China; finished drugs can be manufactured in East China; absorbent cotton and bandage factories should be situated in North and South China; and narcotic products should, in principle, be directly manufactured and controlled by the Ministry of Public Health of the Central People's Government to avoid abuses.

Under present conditions of medicine manufacture in Shanghai and Tientsin, there are more private factories than public ones. Under the policy of the government, these private factories should be given help and support to enable them to develop their scale of production as much as possible. Publicly operated factories which have better equipment and greater capital are better able to manufacture products from raw material. It seems more appropriate that private factories should be assigned the processing of raw material. By thus, cooperating, both private and public factories, their functions clearly defined, will step jointly along the highway of service to the people.

Pharmaceutical Education

We need a program for the preparation of specialists. Under present conditions, there is a general scarcity in China of technical manpower in the pharmaceutical manufacturing industry, hospitals, pharmacies, pharmacies in the

armed forces, medicine merchants, pharmaceutical research, and organizations of pharmaceutical administrations. In a great country with a population of 475 million, the total number of pharmacists and pharmaceutical students is under 6,000, including those engaged in other pharmaceutical pursuits. Of this number, there are about 1,500 pharmacists. This, indeed, makes them as scarce as phoenix feathers and unicorn horns.

How many pharmacists or pharmaceutical workers are needed in China? According to the call of the Ministry of Public Health, the China of the future will need one physician to every 1,000 persons. For the whole country, this will total some 470,000-500,000 physicians. Assuming that one pharmacist is needed for every five physicians, the whole country will need about 100,000 pharmaceutical workers and pharmacists, or one pharmacist to every 5,000 persons, a proportion close to that obtaining in Germany and Japan.

According to statistics, in the USSR a person visits hospitals for medical treatment eight times a year. Sanitation in China is not as good as in the USSR, and this fact, coupled with the lower level of nutrition, causes the chances for contracting illness to be comparatively higher in China than in the USSR. If the average Chinese person were to go to the hospital eight times a year for treatment, there would be a yearly total of 40,000 treatments for the 5,000 persons served by one pharmacist. On the basis of one prescription for each treatment, a pharmacist working 360 days a year would have to prepare approximately 111 prescriptions every day. This number, it seems, would consititue an overburden.

In my personal investigation of the various large hospitals and pharmacies in Peiping, I found that the most one pharmacist can prepare a day is fewer than 50 prescriptions. On this basis, about 200,000 pharmacists are needed to be sufficiently distributed to meet the demand, excluding pharmacists employed by medicinal merchants and factories. Therefore, we need at least 200,000 pharmacists or pharmaceutical workers to collaborate effectively in the work. We know that with the progress of pharmacology and with the gradual increase of ready-made medicines, there will be a corresponding decrease of prescriptions and a consequent decrease in the need of pharmacists. Pharmaceutical students are able to carry on certain categories of the work of pharmacists. If we take it for granted that among the 200,000 pharmaceutical workers, the ratio is one pharmacists to every three pharmaceutical students, the minimum need of our country would be 50,000 pharmacists and 150,000 pharmaceutical students.

These 200,000 pharmaceutical workers (pharmacists and pharmaceutical students) must be trained by means of an organized system of education so that they may plan and participate in the pharmacological construction of the government.

Pharmaceutical education must be governed by the existing needs of China. I herewith supplement briefly certain points:

Regular Education

1. I advocate a system of education built on a framework of three grades. Every stage of this system offers 2 years of training. The first grade would be the pharmaceutical profession school, that is, a school for junior middle-school graduates which is especially designed for training pharmaceutical students. These, after graduation from 2 years' study, would assist pharmacists in preparing prescriptions or may enter the second grade if they desire further study. The second grade, the pharmaceutical college, would be divided into two periods. The sole purpose of the first period is to train pharmacists who are to graduate in 2 years. In the event of their inability to engage in further study, or in times of national need, they can be employed by the government for duties connected with pharmacy.

Students who are not employed by the government and who desire advanced study could enter the second period; however, they are to be guided at this stage by the needs of the country, as well as the special interests of the students themselves in selecting their respective majors, such as pharmaceutical chemistry, biological pharmacology, pharmaceutical engineering, etc. After graduation in 2 years, they could enter pharmaceutical factories or laboratories, or they could serve as directors of hospital pharmacies. They could also enter postgraduate schools for advanced studies, to continue in research. The third grade would consist of the postgraduate school, the final stage of the educational system. It would train pharmaceutical specialists and teachers.

Supplementary Education

Our pressing need for an extremely great number of pharmaceutical workers would be met too slowly by employing only graduates of regular education, and it is therefore necessary to supplement the regular pharmaceutical education. Generally, apprentices to pharmacies, trainees, and pharmaceutical workers in the armed forces, despite their wide experience, feel their lack of understanding of pharmaceutical principles. These persons should be classified on the basis of the length of training needed, grouped accordingly, and taught the necessary principles. After graduation, they may be given employment appropriate to their ability.

With regular education plus supplementary education, we should be able methodically to train 200,000 pharmaceutical workers within a specific period, as directed by our national needs.

Curricula of the various grades of schools must not be selected as haphazardly as in the past. We must develop a specialized curriculum (system of majors) to afford students of the various grades a major education in accordance with the nature of their duties after graduation. In this way, their time would not be wasted, and their learning would be to good purpose.

Also, all text and reference books used by the schools must be in the Chinese language. We must not follow the past colonial type of education which views foreign languages with reverence. When it is inconvenient to translate scientific terms into square Chinese characters, Latin is best used for explanatory notes. The responsibility for editing texts, reference books, and collections of reprints is to be undertaken by the Ministry of Public Health and the Academy of Sciences, or given to the Pharmaceutical Association and various specialists invited by, and who work in conjunction with the editing committee set up by the association.

National Pharmacopoeia

The need for a pharmacopoeia is absolutely urgent. Setting forth pharmaceutical specifications officially established by the Ministry of Public Health, it is the bible and dictionary of physicians, pharmacists, pharmaceutical merchants, and all other pharmaceutical workers. It is now being edited and revised by the Minister of Public Health. Although extremely logical standards have been set up, the scope is, nevertheless, not wide enough. The range of specialized consultants is too narrow. Since a pharmacopoeia must conform to national conditions, the various types of pharmaceutical items should be included only after careful study and experiment. Mere copying and translating would make it only a translated edition of a foreign pharmacopoeia, and we must have a pharmacopoeia which conforms to our national conditions.

To accomplish this, we must recruit medical and pharmaceutical personnel in accordance with their specializations. They must be given the necessary equipment for research and sufficient time for effective collaboration in

experimental study of the purity, nature, effectiveness, dosage, and method of preparation for each medical product to be listed in the pharmacopoeia. A fact which cannot be denied is that following such a program will require the expenditure of a tremendous amount of time, but only by so doing will we be able to call the completed work a Chinese Pharmacopoeia. If this pharmacopoeia is not free from copying, then how can it be called a revised edition?

Pharmaceutical Research

Pharmaceutical research, another important problem of New China, must conform to actualities. It should not be pure research, but research directed toward the solution of particular problems, such as the need for producing certain kinds of medicine. Thus, research work must be carried out in collaboration with factories. When certain kinds of medicine are needed but as yet cannot be produced in China, we begin research in laboratories. If the research is successful, we apply the results in small factories (that is, experimental factories). With further success, we extend their application to commercial factories. If this complete procedure is successful, we will apply it to other medicines which we need but are unable to manufacture. In a like manner, when a new medicine is invented, it is to be submitted to pharmacological experiments and tests to determine its effectiveness and use, then tried in experimental factories and commercial factories. Only by such research methods can China gradually reach independence in the matter of manufacturing pharmaceutical supplies for ourselves and others.

Revision of Chinese Medicine

Chinese medicine has a history of several thousand years. It is the result of an accumulation of experiences. Eighty percent of China's population still use Chinese medicine for treatment. Even if we should wish to do so, the use of Chinese medicine as a solution to the problem of our medicine supplies would be difficult, if not impossible. However, we need to study possible methods of applying Chinese medicine to our supply problems. At present, we should use scientific methods to classify and systematize it, survey its effectiveness, investigate its effective elements, and finally utilize these elements for the production of various pills, powders, ointments, tablets, medicated spirits, and other prescriptions. This may serve temporarily to alleviate the shortage of Western medicine, as well as to counter the outflow to foreign countries of our rights and profits. When we can manufacture and supply ourselves completely with pharmaceutical products, Chinese medicine can then be put on the level of pure scientific research and gloriously expand its effective use.

Regulation of Merchants

It is necessary that existing pharmaceutical merchants be regulated in view of the important influence medicine wields on the lives of the people and on the health of the whole race. As long as these merchants do not hoard, smuggle, sell fake medicine, or manufacture poison, they are free to develop and expand their business under the laws of the government. Also, we must investigate the cultural level, political background, and qualifications of the pharmacists employed by any newly established pharmaceutical merchant.

Pharmaceutical products on the market must be made to conform to national standards and regulations of the Chinese Pharmacopoeia. Whenever necessary, they are subjected to chemical analysis and selective examination. Reasonable advertising is permitted, but falsification if forbidden.

Ninty-five percent of the commercial products of pharmaceutical merchants is composed of ready-made medicine. Logically speaking, ready-made medicine should be handled only by publicly operated agencies. For practical reasons,

merchants may be allowed to sell ready-made medicine, with the following provisions: (1) hereafter, they would not be permitted to stock new ready-made medicine; (2) contents of prescriptions must be open to the public and must be analyzed and approved by legal authorities; (3) no monopoly is permitted; and (4) names of medicines must be uniform. Glucose is purposely named Ku-k'o-ling. Sulfanilamide thiazole is variously called Hsiao-chich-lung, Hsiao-yen thiazole, Soviet thiazole, or O-ku tablets. This practice causes the average person to become confused and liable to exploitation by the merchants. Hereafter, names of medicine must be standardized. For competition, it seems more appropriate that merchants be allowed to put their company labels over names of medicines only with their company labels, such as the use of Wu-Chou, Hsin-Ya, and Hsin-I over the name of aspirin.

Disbribution of Personnel

The lack of pharmaceutical personnel has already been pointed out. Because of poor distribution, most pharmaceutical personnel are concentrated in Shanghai, where there is much overcrowding. Personnel are gravely needed in the Northeast, and there are no pharmacists in Northwest China. Therefore, persons in charge of pharmaceutical policy of the Ministry of Public Health must first make a statistical analysis of pharmaceutical personnel of the whole country and then allocate them in proportion to the needs of various localities of the country. In this way, every person can fully realize his talents thereby becoming of greater use and benefit to the total administration of pharmaceuticals.

Organizations of Pharmaceutical Science

Pharmaceutical workers (weather pharmacists, pharmaceutical students, pharmaceutical assistants, pharmaceutical merchants, pharmaceutical manufacturers, or pharmaceutical science teachers) must organize themselves, unite, and set up the necessary organs to further their own learning, to study in scholastic arts, to assist the government, and to serve the people. Organizations such as pharmaceutical societies, pharmacists' associations, chambers of pharmaceutical industries, and pharmaceutical manufacturing industries associations should all be established under the law and guidance of the government. Unite and attend to the necessary work; accomplish the duties as they should be accomplished and seek the welfare that should be yours!

After organizations have been instituted, we must establish publications, the object of which will be to extend the common foundations of the knowledge of medicine and disseminate it under guidance.

Therefore, in all publications we must take into consideration both advancement and universalization. There should be at least two different kinds of publications. One would be purely scholastic, such as society records which deal with inventions of a research nature, the advancement of scholastic levels, and the exchange of medical knowledge with other countries. Another kind is of a nature popular to the people generally and to those with a layman's knowledge of pharmaceuticals. Both publications should be issued by the Ministry of Public Health and edited by pharmaceutical workers or pharmaceutical societies.

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